ART. XIII.—*Suggestion as to the Cause of the Crepitant Rhonchus.* By EDSON CARR, M. D., of Canandaigua, N. Y.

THE insidious character which pneumonia occasionally assumes, renders the râle crepitant of Laennec, (the crepitant rhonchus of Dr. Williams, the moist crepitus rhonchus of Copland, &c.) worthy of the most attentive consideration, since it is regarded by auscultators as pathognomonic of the *first stage* of the disease, when, for all the purposes of our art, it is of the utmost importance that our diagnosis should be correct.

The sound in question, is described as resembling that which may be produced by rubbing a lock of hair between the thumb and finger, when held near the ear; or that occasioned by the crackling of fine salt, when thrown upon burning coals. Dr. Copland compares it to the crepitation produced by distending a piece of lung with air, after it had been compressed; and thinks it arises from the diminished calibre of the minute bronchi, owing to interstitial effusion, and admixture of respired air, with the secreted or effused fluids in the tubes and air-cells.

It is generally supposed by auscultators, that this sound is caused by the bursting of extremely small bubbles of mucus in the air vesicles and smallest bronchi. Indeed, the latest writers upon this subject, class it among what they denominate the *bullar râles*, and M. Raciborski in particular, makes it depend on the crackling of the bursting bubbles, occasioned by the dry and viscid state of the mucus, of which they are composed.

M. Beau, who has made some very interesting and valuable observations on auscultation, dissents from the opinion commonly entertained respecting the *cause* of this sound, and suggests whether, if we consider that it is not at all modified after a fit of coughing, and also that it is distinctly perceptible in many cases of pneumonia, before any expectoration takes place, it does not more probably depend on *the friction of the pulmonary vesicles*, which, like the pleura, pericardium, and synovial membranes, are probably somewhat dried (dessechées) by the existing inflammatory action.

Admitting that the considerations adduced by M. Beau, appear to constitute a sound objection to the commonly received opinion on this subject, we may still be allowed to inquire, if the views which he has offered as a substitute, are not equally unsatisfactory.

If the sound in question were occasioned by the bursting of minute bubbles of mucus, it ought, like the mucus and submucous râles, to continue through *expiration*, since it is here that the bullar râles are *most* distinct. But every practical auscultator is aware that while it (the râle crepitant) continues uniform quite to the end of *inspiration*, it is suddenly, and entirely suspended at the commencement of *expiration*.

That the bullar râles should be heard *most distinctly* during *expiration*, will appear very obvious, when we consider the admirable arrangement provided for clearing the air passages of the bronchial secretions, and preventing them, as well as all foreign matters inhaled, from gravitating towards the air vesicles.

From the experiments of Sir Charles Bell, and others, it is evident, that the transverse bronchial muscles act in opposition to the elasticity of the cartilaginous rings, which enter into the formation of the bronchial tubes, and that during *inspiration*, these muscles are relaxed, so as to allow the air passsges to expand through their whole extent. The effect of this simple arrangement is to allow the air a free passage to the air-vesicles, without disturbing the mucous with which these passages are lubricated, but during *expiration* these muscles are called into action, the calibre of the tubes is diminished, the air is consequently expelled with greater impetus, the secretions occupying a greater proportion of the calibre of the tubes, are pushed forwards until they accumulate in the larynx, causing sufficient irritation to provoke a powerful expulsive effort, or cough, and are thrown off. Where the secretions are abundant, as in the *later* stages of pneumonia and bronchitis, the free passage of the air is partially obstructed, and more especially during *expiration*, when the tubes are most contracted. These secretions are consequently thrown into agitation, the air mingling with them, forms numerous bubbles, the bursting of which, gives rise to the louder bullar râles.

But a very different state of things exists in the *early* stage of pneumonia, where the crepitant râle is heard.

I believe M. Beau and Dr. Williams are quite correct in supposing that the bronchial membranes are somewhat dried by the existing inflammatory action, since one of the most manifest changes observed during the early stages of pneumonia, is a suspension of the aqueous exhalation from the bronchial membranes. Now, the suspension of this function necessarily leaves the mucous with which the air-passages are lubricated, in so thick and tenacious a condition, that these membranes are glued together whenever they come in contact. The pulmonary tissue being more or less compressed by the descent of the ribs, and the rising of the diaphragm during every *expiration*, the bronchial membranes are to a greater or less extent forced into direct contact. The capillary congestion and interstitial effusion, which are among the essential elements of pneumonia, must greatly increase the volume of the diseased lung, and consequently augment the compression of the pulmonary tissue, and facilitate the adhesion or gluing together of the bronchial vesicles.

Now, during every *inspiration*, the air rushing into and distending these vesicles, necessarily overcomes these cohesions. And would not the separating of these membranes thus glued together by tenacious mucus, naturally produce precisely such sounds as constitute the crepitant râle of pneumonia? If this view of the phenomena be correct, it is not strange that "distending a piece of lung with air after it has been compressed," should give rise to a similar râle.

A great variety of experiments might here be introduced, to illustrate this view of the phenomena. One of the most simple, is that of moistening the thumb and finger with very thick paste, or mucilage of gum arabic, and alternately pinching them together and separating them when held near the ear.

By repeating and modifying this simple experiment, sounds may be produced so perfectly imitating the crepitant râle of pneumonia, that I am persuaded that no one who will take the trouble to try it, will doubt this explanation of its cause.

To those who have bestowed but little attention to the subject of the physical signs of disease, such inquiries may appear of little consequence. But the careful and experienced auscultator will appreciate the following sentiment of the author of one of the best works on diseases of the chest, that has appeared in the English language.

"I have ever found in practice, and it is perfectly conformable to reason, that the easiest and most agreeable way to study physical signs, and to attain the surest criterion of their value and importance, is by considering *how they are caused*, or what are the relations in which they stand to the physiological and pathological states that produce them."

Canandaigua, Aug. 20, 1842.

Art. XIV.—*On Creasote in diseases of the Conjunctiva and Cornea.* By Chas. C. Hildreth, M. D., of Zanesville, Ohio.

Creasote has for many years been found a most efficient remedy in disease of the mucous and dermoid tissues. It has been precribed with good effect in ulceration of the mucous membrane of the mouth, ear, and nose; in foul or sloughing ulcers of the skin, and in various cutaneous diseases. It has been found valuable in the arrest of hæmorrhage, in rheumatism, in odontalgia, in nausea and vomiting of a certain character, &c. &c.

Its properties are said to be stimulant, astringent, and antiseptic. As most of the topical applications for disease of the external tunics of the eye are of a somewhat similar character, I was led from analogy to its use in such cases. And as its sanative and healing influence is obvious and generally acknowledged in ulceration of other mucous membranes, I was led to expect something from its use in similar disease of the eye.

In the year 1836, in a case of opacity of the cornea, the result of scrofulous ophthalmia, I first prescribed the creasote in disease of the eye.